Interim Progress Report Submitted to
NOAA's Human Dimensions of Global Change Research (HDGCR) Program

Project Title: Development of Climate Forecasts Decision Making Teaching Materials for Junior High School Teachers and Students

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I. Preliminary Materials

A. Project Abstract

Development and testing of teaching material on the proper use of probabilistic forecasts in decision making for junior high school students is the focus of the proposed study. Application of climate forecasts provides a unique opportunity to integrate probabilistic decision making into different subject matter. Objectives of the study include development of materials, which junior high school teachers can use, improved knowledge concerning climate forecasts and their use by the students, and improved comprehension and inference making by the students. Environmental education materials, including climate related material, developed for grade levels K-12 have focus almost exclusively on the physical sciences. Little to no materials have been developed concerning the social science aspects of environmental issues. This research is a start toward filling this gap in the development of education material.

B. Objectives of Research Project

The objectives of the proposed project are directed towards both teachers and students at the junior high level. Development of instructional material and education of teachers to incorporate probabilistic information into the decision-making process is the primary objective directed towards teachers. Two primary objectives are directed towards students. The first is improving the ability to understand and use probabilistic climate forecasts. Improving students' ability to comprehend subject matter, make inferences concerning decision-making, and develop the ability to use probabilistic information is the second objective directed towards students. These objectives will be met through developing, testing, and disseminating units of instruction. The units of instruction will focus on use of probabilistic information in decision-making processes with climate forecasts as the learning context. The proposed study will be a pilot project in nature, focusing on junior high students in rural school districts in Texas. Knowledge gained and units of instruction developed will, however, be made available for wider dissemination.

C. Approach

The methodology consists of the following components. Although listed sequentially, several of the components are being conducted simultaneously.

Interaction with Teachers
Student Focus Groups
Pre- and Post-testing of Students
Development of Units of Instruction
Revision of Units of Instruction
Delivery, Technology, and Dissemination

D. Matching Funds

None

II. Interactions

We met with 6th grade teachers in College Station Independent School District to develop the climate teaching material. Teachers in both College Station and Victoria Independent School Districts tested the material in their classrooms during Spring of 2006. As noted below, we have had informal contact with teachers across the U.S. interested in the teaching material developed.

III. Accomplishments

We have completed the project, except for publishing a research paper.

We have developed DECIDE Teaching Decision-Making Using Weather and Climate Principles. The Climate Unit was tested using 6th and 8th grade students

in the College Station and Victoria Independent School Districts in the Spring of 2006. Using three teachers provided the following experimental design. First, control classes are designated. In these classrooms, the teacher introduced 1) decision making and 2) science can help in the decision making process. Science principles were taught, but no decision making tools were taught. Four eighth grade classes in Victoria, TX are the control group. Next, one teacher agreed to rigorously teach all of the *DECIDE – Weather Unit* to her five sixth grade classes in Victoria. These classes are designated the complete group. Third, for a variety of reasons including standardized testing, realistically if teachers are to adopt the *DECIDE*, they will adopt only parts and not all of the material. In fact, *DECIDE* was developed with this reality in mind. Therefore, the third teacher agreed to teach science principles and decision making, but she was selective on the material covered. Six sixth grade classes in College Station fall into this partial group. To increase realism, the researchers provided only minimal support during the testing of *DECIDE*. Data from 397 students participating in the project was obtained. Results suggest the following 1) the teaching materials developed are both gender and race neutral 2) relative to the control group, but the complete and partial group scored better on a decision making test, and 3) the complete group scored better on the test than the partial group. It appears students in the 6^{th} – 8^{th} grades are able to comprehend decision making topics and apply them.

An article on *DECIDE – Climate Unit* has been accepted for publication in *Science Scope* (March 2007), a peer reviewed journal for middle level and junior high school science teachers.

A manuscript to be submitted to a science education journal is currently being drafted.

A website for the project has been developed. This web site was given in the above mentioned article and is being used to facilitate distribution of DECIDE. All material is available on the web site as free downloads. The web site is TeachingDecisionMaking.tamu.edu.

Publications

Holye, J.E., J.W. Mjelde, and K.K. Litzenberg. AWeather to Make a Decision.@ *Science Scope* 29(February 2006):24-27.

Mjelde, J.W., K.K. Litzenberg, J.E. Holye, S.R. Holochwost, and S. Funkhouser. AFires, Floods, and Hurricanes: Is ENSO to Blame?@ Forthcoming *Science Scope* March 2007.

Mjelde, J.W. and K.K. Litzenberg. "Using Science Curriculum to Teach Decision Making: A Probabilistic Approach." Working Paper, Department of Agricultural Economics, Texas A&M University, College Station, TX 2007.

IV. Relevance to the field of human-environmental interactions

This project is unique in that 1) it does not address current decision makers, rather potential future decision makers, and 2) it does not fit cleanly into any of the specific areas of study. However, the project may have long run implications for these areas of study. If successful, improving the ability of junior high school students to use probabilistic decision making concepts will in the future improve the use of climate information.

The project also helps fills a gap in the instructional material. Few materials have been developed concerning the social science aspects of environmental issues. This study is a start toward filling this gap in the development of education material. What is important is material that can be use in the classroom that fits in with the classroom material and national standards.

V. Graphics

None at this point.

VI. Website Address

TeachingDecisionMaking.tamu.edu